ORD Research and Technical Support Needs, and Follow-Up Activities
Mining Waste Scientist to Scientist Meeting
EPA/ORD National Exposure Research Laboratory
Las Vegas, Nevada
June 14-15, 2000

Disclaimer:

The handouts, overheads, papers, materials, etc. from EPA's "Mining Waste Scientist to Scientist Meeting" on June 14-15, 2000 in EPA/ORD's National Exposure Research Laboratory in Las Vegas, Nevada are intended for internal Agency discussion purposes only, and the positions noted in any of the papers, materials, etc. from this meeting are the views of the individual presenters only and do not necessarily reflect the position of the Agency or organization of the presenter.

I. List of Needs and Follow-up Activities

A) Research Planning Needs/Follow-Up Activities

Tweak some ongoing research to more directly address mining research needs.

Identify direct technical support on site specific field projects as a critical performance element ORD scientists' position descriptions.

Regions should coordinate and develop a prioritized 'short list' of Regional needs.

The EPA National Hardrock Mining Workgroup/Team should assist ORD in identifying mining research priorities, identifying candidate sites for field investigations, and promoting the wider use of ORD developed investigation and remediation technologies. ORD should become an active member of the Mining Workgroup/Team.

Note: ORD agreed to participate on the mining team, in part because the team's activities will help keep ORD in the loop on EPA's scientific/technical mining issues and help provide team members with a conduit to ORD. Larry Eccles (ORD/NERL), Jim Lazorchak (ORD/NERL), Ed Bates (ORD/NRMRL), Diana Bless (ORD/NRMRL), and Ed Hanlon (ORD/OSP) will participate as team members and try to call in for the monthly calls on a regular basis.

Elevate mining issues as a priority item within the research planning process.

The Regions should propose mining issues as a grant category when the Hazardous Substance Research Center (HSRC) grants are recompeted and in the STAR grant program.

Regional and Program office staff should provide input to their counterparts on the waste research coordination team (RCT). Regional Superfund contacts are Dick Willey of Region 1 (FY 2000), and Jeff Josephson from Region 2 (FY 2001). Regional RCRA contacts are Stephanie Branche from Region 3 (FY2000), and an unnamed person from Region 4 or 8 (FY2001). OSW's contact is Jan Young; for OERR, Sharon Frey. Regional scientists include: Region 1, Don Porteus; Region 2, Rollie Hemmet; Region 3, Sumner Crosby; Region 4, Bill Cosgrove; Region 5, Howard Zar; Region 6, Norm Dyer; Region 7, John Helvig; Region 8, Tony Medrano; Region 9, Winona Victery; and Region 10, Gretchen Hayslip. STLs include: Steve Mangion, Region 1; Jon Josephs, Region 2; Norm Kulujian, Region 3; Felicia Barnett, Region 4; Bob Mournigham, Region 7; Bob Stone, Region 8; Mike Gill, Region 9; and John Barich, Region 10.

B) Technical Support Needs/Follow-Up Activities

Need ORD technical support to help develop the 'science' of decision-making (which is as important as the science itself).

Need ORD technical support to help Regions and Program offices (e.g., help in reviews of proposals).

Need ORD lab staff access to travel dollars to perform field activities, particularly for non-Superfund issues.

Need enhanced technical support from EPA to States, Tribes and other federal agencies.

Need technical information on surface reclamation, the use of coal combustion by-products, passive treatment options, and mining economics (cost/benefits) of dealing with issues such as treating/removing AMD.

Need ORD participation on the USGS Acid Mine Drainage Technology Initiative.

C) Regulatory and Non-scientific Needs/Follow-Up Activities

OW should develop new effluent guidelines for metal mining.

OSW should develop a Subtitle C or D rule for mining waste.

Modify CWA statutes to address liability concerns associated with cleanup projects, and accept good-Samaritan projects that make some progress toward environmental goals, even if they do not fully achieve those goals.

Develop mine waste management standards.

-management strategies to achieve realistic cleanup goals.
-closure performance standards that attain environmental goals on a perpetual basis with affordable, manageable, and achievable O&M requirements.
-Financial assurance requirements that reflect environmental risk considerations and estimates of capital and O&M costs.

Need Headquarters written response to the mining-related memo sent by Region 10 to the Deputy Administrator in February 2000.

D) Biological/Ecological/Environmental Effects Needs/Follow-Up Activities

Need cumulative impact assessment research.

EMAP system should be usable on a watershed framework basis.

Need ability to predict ecological population responses to stressors (acclimation, adaptation, or extinction.)

Need research on the use and applicability of Water Effect Ratio testing in CERCLA ecological risk assessments.

Need research on criteria benefiting from species weight adjustment or normalization.

Need research on how salts mediate toxicity of metals in water.

Need research on trout feeding:

-techniques to quantify wild fry diets,
-diet contents,
-factors that influence bioavailability of metals in the fish gut,
-factors in designing a study around dietary exposure, and
-standard procedures to prevent confounding factors.

Need research on biomarkers to address relationships between growth and biomarker response and growth effects and population decline.

Need research to determine threshold levels for adverse biomarker response.

Need research to assess mechanisms and relative importance of avoidance behavior.

Need research on wildlife bioavailability.

Need research on how to reduce the biouptake and bioflow of contaminants.

Need research on what factors are most important to consider in the absorption of metals in different species.

Need research on what changes in wetland condition results in metals release from the wetland.

E) Characterization/Monitoring Needs/Follow-Up Activities

Expand ORD's *Characterization of Mine Leachates and the Development of a Ground-Water Monitoring Strategy for Mine Sites* (EPA 600-R-99-007) research to confirm that the approach to finger-printing of groundwater is accurate and effective.

Additional funding, seepage and surface water data, and research is needed to develop effective methodology based on "fingerprinting" to determine seepage of mine leachates to surface waters.

EPA should develop its own peer-reviewed method for the characterization of waste rock and tailings and how to extrapolate that data for the life of the mine.

Need to research and develop geostatistical methods for waste rock and tailings.

Need to analyze short- and long-term leachate from cyanide gold heaps.

Need site characterization tools that assess future environmental conditions.

Need monitoring programs that provide advance warning of environmental problems.

Need verified, validated and standardized methods for monitoring.

Need site characterization research involving field observations.

Need analytical methods for speciating only those forms of mercury (and other toxic metals) that are toxic to humans or ecological species.

Need solid phase extraction and analysis methods.

F) Remote Sensing Needs/Follow-Up Activities

Need research on:

-better atmospheric correction/radiative transfer models,
-pollutant-specific spectral libraries,

-careful validation studies,
-better DEM automated editing tools,
-better ways to integrate new sensor information into models and indicators, and
-improved data registration.

Need remote sensing-related infrastructure including:
-training at all levels,
-improvements in networks and desktop mapping,
-establishment of a geospatial data and visualization center, and
-better automated DEM editing tools.

G) Modeling and Predictive Tools; Fate/Transport Needs/Follow-Up Activities

Need peer-reviewed methods for predicting acid rock drainage.

Need prediction tools for environmental impacts from mine development, operation, and long-term site conditions.

Need tools that can estimate whether MCLs can be met at mining sites.

Need research regarding:
-acidity and liberation of toxic metals from sulfide mineral oxidation.
-accurate models of kinetically limited processes.
-improved mechanistic models of partitioning and sorption on all surfaces.
-models of metal mobility and bioavailability in soils and sediments.
-multimedia models of mercury fate and transport.
-algorithms for estimating biogeochemical reactivity of ionic species and chemical activity under conditions of high ionic strength.
-Pitzer relationships for metals of interest to EPA.

Mercury research needs include:
-development of mechanistic models of mercury surface exchanges.
-development of mechanistic models describing monomethylmercury formation.
-development of datasets on the behavior of mercury in the environment.
-assessment of the potential of a regional/global distillation effect with mercury.

The FRAMES model should be adjusted to allow site specific or watershed-wide or region specific applications.

Regions need a map of Total Maximum Daily Load (TMDL) (Section 303d of the Clean Water Act) in mining watersheds.

H) Risk Assessment Needs/Follow-Up Activities

Need research to address eco risk issues associated with aquatic, amphibian, and avian risks from exposure to selenium.

I) Remediation and Treatment/Control of Releases from Mining Sites Needs/Follow-Up Activities

Need research regarding:

-metal binding mechanisms to determine the effectiveness of using chemically amended compost to remediate metal-contaminated soils.
-cost-effective, low O&M mitigation technologies.
-how various effluent limits can be achieved in the field.
-improved methods to prevent and mitigate AMD.
-evaluation of the PACE technology and pyrite removal methods.
-permanent solutions for sealing deep mines and treatment of coal combustion wastes
-surface reclamation
-the use of coal combustion by products
-passive treatment options
-mining economics (cost/benefits) of treating/removing AMD
-metal recovery issues
-long term effectiveness of constructed wetlands.

J) Technical Transfer Needs/Follow-Up Activities

ORD participation needed on the monthly Agency-wide mining team conference calls.

Need a mining-related and focused information sharing system.

-need a one-page description of all ORD laboratory projects related to mining
-need a system to access ORD expertise, subject matter experts and supported research.
-need a regularly updated list of mining related activities to identify who's doing what.
-need a searchable database of activities.

Need both an Intranet and Internet web site for mining waste issues.

-linked to Environmental Information Management System (EIMS)
-should have a list server option possibly under Lotus Notes, complemented by an Intranet site that contains sensitive information and an internal ListServ for intra-Agency discussions.
-the web address be something simple like epa.gov.mining.
-need a chat option
-have a searchable bibliographic section to include:

-existing bibliographies,
-the ORD/NRMRL bibliography handout prepared for this meeting
-the ‘what’s happening’ tables prepared by the steering committee
-bibliographic information from other agencies
-the bibliographic electronic search performed by EPA’s contractor
-a bibliography on characterization and remediation technologies.

Roger Wilmoth agreed to provide resources to develop and maintain the web site(s.)

Meeting participants should send Roger Wilmoth their ‘wish list’ identifying what options, links, etc. they would like to see on both an EPA Intranet and Internet mining waste web site.

II. Annotated List of Needs and Follow-up Activities

Research Planning Needs/Follow-Up Activities

Nick Ceto stated that research money is needed to help address the various issues identified related to mining waste. He also noted that because there is not always a direct connection between research projects and mining issues, some ongoing research should be tweaked to more directly address mining research needs.

Various participants noted that the Regions want ORD's principal investigators (PI's) to do more, and more consistent, region-specific mining-related research and technical assistance. Because incentives in the position descriptions of laboratory scientists often do not account for technical support to the Regional or Program offices, Nick Ceto requested that an element of ORD scientists' position description identify direct technical support on site specific field projects as a critical performance element. Paul Zielinski said that he has met with ORD management and is working to include technical support in ORD researchers' job performance measures.

Nick Ceto noted that the Regions need to send a consistent message to ORD about Regional needs. Ed Hanlon noted that perhaps the Regions could coordinate among themselves and prioritize requests to the labs for technical assistance to help ensure that the most significant, wide ranging problems and issues are raised. Dave Brown said it would help ORD to receive a prioritized 'short list' of Regional needs.

Nick Ceto noted that the EPA National Hardrock Mining Workgroup/Team would like to serve as a focal point for a continuing dialogue with ORD on mining issues. Nick noted that the Workgroup/Team will assist ORD in identifying mining research priorities, identifying candidate sites for field investigations, and promoting the wider use of ORD developed investigation and remediation technologies. Nick recommended that the Workgroup/Team get together and prioritize needs across the Regions, and invited ORD to become an active member of the Mining Workgroup/Team. Nick said that National Mining Workgroup/Team also can prepare a short paper that describes why mining issues are very important to the Regions and the Agency.

Mike Bishop noted that from an ORD perspective, mining issues might not be a priority, and asked how the regions can get more upper-level support on these issues in the Agency. Roger Wilmoth said that attention by the Laboratory Directors (and not just the Associate lab directors) is needed. Ed Hanlon noted that the Regional and Program Office Directors also need to be involved. Bob Puls said that the labs are interested in researching the issues, but the problem is being able to direct research funds. Puls noted that there is difficulty moving ORD towards new areas of research, and that the research planning role Paul Zielinski plays is vital to keeping ORD's eyes on the priority needs of the Regions. Mining issues need to be elevated within the research planning process.

Paul Zielinski said that mining issues need to be incorporated into ORD's research planning

process, and that a base program needs to be developed to encourage commitments from the Laboratory Directors. Jan Baxter said that working through the ORD planning process is a good idea, but the turn-around times are long (e.g., six years from beginning of the planning process to the receipt of research data.) She said that the Regions need help from ORD in the short-term also. Dave Reisman suggested segregating/differentiating between the long term and short term goals and needs, and differentiate between the most significant and less significant issues and topics of interest.

Paul Zielinski said that the Hazardous Substance Research Center (HSRC) grants will be recompeted soon, and the Regions can propose including mining issues as a grant category. The western center in particular has strong potential to add regional issues. In addition, Regions can propose including mining issues as STAR grant topics to help focus more university towards this topic.

To help ensure that Regional and Program Office research needs are properly communicated in the planning process, it was noted that Regional and Program office staff should stay in touch with their counterparts who participate on the waste research coordination team (RCT). Regional Superfund contacts are Dick Willey of Region 1 (FY 2000), and Jeff Josephson from Region 2 (FY 2001). Regional RCRA contacts are Stephanie Branche from Region 3 (FY2000), and an unnamed person from Region 4 or 8 (FY2001). For OSWER, OSW's contact is Jan Young; for OERR, Sharon Frey. Regional scientists include: Region 1, Don Porteus; Region 2, Rollie Hemmet; Region 3, Sumner Crosby; Region 4, Bill Cosgrove; Region 5, Howard Zar; Region 6, Norm Dyer; Region 7, John Helvig; Region 8, Tony Medrano; Region 9, Winona Victery; and Region 10, Gretchen Hayslip. STLs include: Steve Mangion, Region 1; Jon Josephs, Region 2; Norm Kulujian, Region 3; Felicia Barnett, Region 4; Bob Mournigham, Region 7; Bob Stone, Region 8; Mike Gill, Region 9; and John Barich, Region 10.

Technical Support Needs/Follow-Up Activities

Nick Ceto stated that ORD technical support is needed to help Regions and the Program offices address the various issues identified related to mining waste. Nick emphasized that the science of decision-making is as important as the science itself. Carol Russell requested that ORD assist on mining-related technical reviews. Nick Ceto, Mike Bishop and Anne Dailey requested ORD assistance in evaluating various technical issues and remedial proposals submitted to the Regions by mining companies (e.g., cover tailings with water (lakes) to decrease oxygen diffusion; effectiveness of rinds on precipitates of sulfide materials; use of constructed wetlands, Ceto noted that research and regulatory options were needed in providing flexibility with performance standards.

A variety of participants noted that the current ORD Technical Support Centers only cover Superfund and RCRA sites, and that most newer mining sites do not fall into either of these categories. However, even if individual mining sites are not Superfund or RCRA sites, the issues

they face may be applicable to Superfund or RCRA sites in general. Bob Puls noted that ORD lab staff need access to travel dollars to perform field activities, and that while Superfund allows site-specific travel, non-Superfund issues are difficult to address due to limits on travel.

Nick noted that enhanced technical support from EPA to States, Tribes and other federal agencies is needed and critical to help support these entities' efforts to provide adequate programs for oversight of mine site development, operation, and closure, and help prevent the need for EPA to conduct and fund cleanup actions.

Bernie Sarnoski requested technical information on surface reclamation, the use of coal combustion by-products, passive treatment options, and mining economics (cost/benefits) of dealing with issues such as treating/removing AMD.

Carol Russell requested ORD participation in the USGS Acid Mine Drainage Technology Initiative. Russell noted that there are four workgroups on the Initiative, including sampling/monitoring, prediction, remediation and modeling workgroups.

Interagency Coordination Needs/Follow-Up Activities

Steve Hoffman noted that in the future, a greater emphasis will be placed on mine closure and reclamation as the number of active mine sites continues to decline. There will be an increased need to assist the Bureau of Land Management and Forest Service with their analysis of mines on Federal lands.

As noted above, Nick Ceto noted that enhanced technical support from EPA to States, Tribes and other federal agencies is needed and critical to help support these entities' efforts to provide adequate programs for oversight of mine site development, operation, and closure, and help prevent the need for EPA to conduct and fund cleanup actions.

Regulatory and Non-scientific Needs/Follow-Up Activities

Steve Hoffman felt that because directed research funding is limited and likely to become increasingly scarce, the funding shortfall could be addressed in several ways. First, companies could be forced to perform research for the Agency that could then be peer reviewed. Secondly, the academic community could be encouraged to conduct research that is more applicable to permitting and enforcement needs. Thirdly, collaborative research during rule development should be explored.

Steve Hoffman felt that within EPA, OW needs to develop new effluent guidelines for metal mining, and OSW needs to develop a Subtitle C or D rule for mining waste. Carol Russell and Nick Ceto also requested new and updated effluent guidelines. Nick also noted that while current

CERCLA regulations address many liability concerns associated with cleanup projects, current CWA statutes do not. The CWA needs to be modified to accept good-Samaritan projects that make some progress toward environmental goals, even if they do not fully achieve those goals.

Nick Ceto stated that mine waste management standards must be developed. Nick requested research on unique environmental issues in historic mining districts, including management strategies to achieve realistic cleanup goals. The establishment of closure performance standards are needed that attain environmental goals on a perpetual basis with affordable, manageable, and achievable O&M requirements. Financial assurance requirements that reflect environmental risk considerations at a mine site should be developed to encourage implementation of mine closure by mine operators instead of government agencies. These requirements must be supported by an accurate analysis of long-term environmental risk and estimates of capital and O&M costs. Environmental performance standards in historic mining districts must be developed to address the problems presented by extensive areas of waste disposal leading to chemical and physical effects on the aquatic ecosystem.

Nick Ceto expressed the Regional frustration regarding the lack of written response to the mining-related memo sent by Region 10 to the Deputy Administrator in February 2000. They are now trying to mobilize a Headquarters team to elevate the issue. Bernie Sarnoski said that mining issues and AMD is one of Region 3's top five priorities, and that they could help to elevate the issue. Bernie noted that a former Region 3 EPA manager, Michael McCabe, is now a senior manager in Headquarters, and could possibly be tapped to help provide support.

Biological/Ecological/Environmental Effects Needs/Follow-Up Activities

Nick Ceto requested research on unique environmental issues in historic mining districts, including cumulative impact assessment.

Participants requested to use the EMAP system on a watershed framework basis, but Mike McDonald noted that he wasn't sure when local watershed data would be available to allow such applications, and surmised that perhaps within seven years widespread applicability of the system to watershed might be available. McDonald also noted that the use of probabilistic data may make it difficult to examine smaller watersheds and small areas within larger watersheds might hinder EMAP's usability in this regard.

Jim Lazorchak said that the ability to predict ecological population responses to stressors (acclimation, adaptation, or extinction) is a research need. Future contributions from Agency genetics researchers are anticipated, including assessment of bioavailability differences between sites and assessment of population structure and gene flow within a region.

Dale Hoff proposed use of Water Effect Ratio testing in CERCLA ecological risk assessments as an ORD research need. Hoff noted that although not basic research, it is important to the

programs. Further study could determine other criteria that would benefit from weight adjustment or normalization and the importance of different salts in mediating the toxicity of metals in water. Hoff proposed trout feeding studies as a second ORD research need. In order of priority, trout feeding studies could address techniques to quantify wild fry diets, diet contents, factors that influence bioavailability of metals in the fish gut, factors that need to be considered in designing a study around dietary exposure, and standard procedures to prevent confounding factors. Biomarkers are a third potential ORD research need, addressing relationships between growth and biomarker response and growth effects and population decline. Research could also determine a threshold level (if any) for a biomarker response that indicates adverse effects. The mechanisms and relative importance of avoidance behavior is a fourth potential ORD research need. In addition, there are still many wildlife research questions revolving around bioavailability. Hoff reiterated that most of the needs presented are not basic research. However, Hoff feels that most programmatic needs can be met through coordination between Regional scientists and basic research scientists. A key eco concern at Anaconda site is how to reduce the biouptake and bioflow of contaminants.

Dale Hoff urged ORD to follow up on basic research that may have important Regional applications. This could occur through groups such as the BTAG coordinators in Superfund. Hoff reminded participants that Regional scientists may be used as a source of ideas and labor.

A participant noted that research is needed on what changes in wetland condition results in metals release from the wetland.

Characterization/Monitoring Needs/Follow-Up Activities

Steve Hoffman noted that ORD's *Characterization of Mine Leachates and the Development of a Ground-Water Monitoring Strategy for Mine Sites* (EPA 600-R-99-007) should be expanded to confirm that the approach to finger-printing of groundwater is accurate and effective.

Steve Hoffman requested that EPA develop its own peer-reviewed method for the characterization of waste rock and tailings. Mining companies often use limited core and bulk sampling and then extrapolate that data for the life of the mine. EPA needs to be able to consider how a mine's characteristics change with time. Finally, the increasing number of cyanide gold heap leaches that are closing emphasizes the need to analyze short- and long-term leachate from these units.

Nick Ceto requested research on unique environmental issues in historic mining districts must be conducted, including site characterization. Adequate site characterization tools are needed to understand future environmental conditions and establish closure standards that address those concerns. In addition, monitoring programs that provide advance warning of environmental problems must be designed to permit mitigation actions.

Carol Russell requested that ORD assist on mining-related verification/validation of methods, and standardized methods for monitoring. Carol also requested site characterization research involving field observations.

Ed Heithmar noted that it would be helpful if an analytical method were developed that speciates and analyzes only those forms of mercury compound classes that are toxic to humans or ecological species.

Bob Puls noted that a key research need related to mine waste assessments is solid phase extraction and analysis methods.

Remote Sensing Needs/Follow-Up Activities

Bernie Sarnoski requested more basic remote sensing research. Tom Mace identified various research and infrastructure needs. Research needs include better atmospheric correction/radiative transfer models, pollutant-specific spectral libraries, careful validation studies, better DEM automated editing tools, better ways to integrate new sensor information into models and indicators, and improved data registration. Infrastructure needs include training at all levels, improvements in networks and desktop mapping, and establishment of a geospatial data and visualization center. Mace also noted that better automated DEM editing tools are needed to remove glitches from airborne and satellite radar topographic mapping.

Modeling and Predictive Tools; Fate/Transport Needs/Follow-Up Activities

Steve Hoffman noted that OSW is frequently forced to rely on the British Columbia (BC) method for predicting acid rock drainage. While the BC is an adequate method, EPA should develop its own peer-reviewed method and apply it consistently. Nick Ceto and Bernie Sarnoski also noted that improved methods of AMD prediction would also be extremely valuable.

Nick Ceto requested that prediction tools must be developed for environmental impacts from mine development, operation, and long-term site conditions. Adequate predictive tools are needed to understand future environmental conditions and establish closure standards that address those concerns. Tools that can estimate whether MCLs can be met at sites are needed, in part because companies argue that they will not be able to achieve MCLs and he does not have sufficient tools or data to counter that claim.

Nick Loux noted that more research is needed to develop long-term solutions that address the acidity and liberation of toxic metals from the oxidation of sulfide minerals. More research is also needed regarding: 1) accurate models of kinetically limited processes; 2) improved mechanistic models of partitioning and sorption on all surfaces; 3) models of metal mobility and bioavailability in soils and sediments; and 4) multimedia models of mercury fate and transport (although Loux

did state that there are numerous public and private sector research projects in these areas.) Additional research is also needed in developing algorithms for estimating biogeochemical reactivity of ionic species and chemical activity under conditions of high ionic strength, and in developing Pitzer relationships for metals of interest to EPA.

Nick Loux noted that mercury research needs include: 1) development of mechanistic models of mercury surface exchanges; 2) development of mechanistic models describing monomethylmercury formation; 3) development of datasets on the behavior of mercury in the environment; and 4) assessment of the potential of a regional/global distillation effect with mercury.

A participant asked when the FRAMES model being used for OSWER's HWIR proposed regulation could be run on a site specific or watershed-wide or region specific application; Dave Brown noted that this is still on the drawing board.

Carol Russell said that the Regions need a map of Total Maximum Daily Load (TMDL) (Section 303d of the Clean Water Act) in mining watersheds. The USGS attempted to develop this map but upset the states. Russell said that a new map will soon be available on EPA's web site, but it will not show many impacted sites.

Carol Russell noted that tools are needed for rapid screening of waste dumps and tailings, and that the Regions also need new, low-cost methods for prevention of acid mine drainage.

Remediation and Treatment/Control of Releases from Mining Sites Needs/Follow-Up Activities

Steve Hoffman requested additional research about metal binding mechanisms related to ORD's studies in Montana and Missouri to determine the effectiveness of using chemically amended compost to remediate metal-contaminated soils.

Nick Ceto requested research on mitigation technologies, to address environmental threats posed by mining and mineral processing facilities with cost-effective, low O&M approaches. Research showing that various effluent limits can be achieved in the field would be very helpful (some potentially responsible parties (PRPs) at sites claim that such limits are very difficult or impracticable to reach.) Low cost and low-O&M remediation tools are needed to address remote mining sites and aid in enforcement. Improved methods of AMD prevention and mitigation would also be extremely valuable.

Rick Wilkin said that ORD is looking to conduct a small-scale permeable reactive barrier (PRB) demonstration and then demonstrate the technology at a larger site. Nick Ceto said that he has a site in the RI/FS stage where a PRB is one of the remedial technologies being considered.

Carol Russell requested evaluation of the PACE technology and pyrite removal methods. Bernie Sarnoski requested permanent solutions for sealing deep mines and treatment of coal combustion wastes; information on surface reclamation; need information on the use of coal combustion by products; information on passive treatment options; information on mining economics (cost/benefits) of dealing with issues such as treating/removing AMD; research related to metal recovery issues; and verification of "miracle prescriptions." Anne Dailey requested research regarding the long term effectiveness of constructed wetlands, particularly since water quality standards are so stringent.

Technical Transfer Needs/Follow-Up Activities

Steve Hoffman noted that the headquarters mining team meets on an informal basis and participates in the monthly Agency-wide conference calls, and that ORD could participate on these calls to stay up on Regional and Program office mining needs and issues.

Participants noted that there is a problem providing Regional and Program office staff with tools associated with mining waste technical transfer, needs lists', and in getting other related information down to the staff level. Carol Russell requested that ORD assist in developing a mining-related and focused information sharing system. Jan Baxter said that a one-page description of all ORD laboratory projects related to mining would be very helpful. Nick Ceto requested a system the Regions could use to access ORD expertise, including a system for better access to ORD subject matter experts and ORD supported research. Nick Ceto stated that ORD outreach combined with accessible contacts within ORD for the Regions could help alleviate Regional difficulties in keeping up with ongoing ORD research. Participants requested that a list of mining related activities be developed and regularly updated to identify who's doing what.

Paul Zielinski said he will put together a searchable database on who is doing what work related to mining and how to contact those people. Paul said he would make sure that the contacts database gets to the right people in the Regional and Program offices.

A majority of participants felt that EPA should develop both an Intranet and Internet web site for mining waste issues. Tom Mace recommended linking the site to the Environmental Information Management System (EIMS) currently under development. A participant requested that the Agency have a list server option possibly under Lotus Notes, which could be complemented by an Intranet site that contains sensitive information (including information within EIMS that would not be visible via the Internet) and an internal ListServ for intra-Agency discussions. One suggestion was that if EPA developed its own web sites, that the web address be something simple like epa.gov.mining. One participant requested that a chat option be provided. It was requested that any web sites to be developed have a searchable bibliographic section; items to be added on this link include existing bibliographies, the ORD/NRMRL bibliography handout prepared for this meeting by Diana Bless, the 'what's happening' tables prepared by the steering committee for this meeting, the bibliographic information submitted to Ed Hanlon by the other

agencies prior to the meeting, the bibliographic electronic search to be performed by EPA's contractor for this meeting, and other related information. Carol Russell requested a bibliography on characterization and remediation technologies.

Roger Wilmoth agreed to provide resources to develop and maintain the web site(s.) However, Wilmoth noted that the site would be developed with NRMRL, not Mine Waste Technology Program funds, and would therefore be subject to any future fiscal constraints. Carol Russell asked meeting participants to send Roger Wilmoth their 'wish list' identifying what options, links, etc. they would like to see on both an EPA Intranet and Internet mining waste web site. Wilmoth and Bless will develop a prototype based on the discussions held and any additional suggestions for design or content provided by meeting participants. This will then be distributed for comment.

It was generally agreed that an electronic bibliographical search by EPA's contractor for the main issues/topics of interest identified for this meeting would be of value.